COLOR SEGMENTATION IN THE ROBOCUP SMALL SIZE LEAGUE

Results of Team Trashold
PROBLEM
EASY AND FAST SETUP

1. Empty Field
2. Capture Background
3. Put Calibration Pattern on Field
4. Capture Calibration Pattern
5. Done in < 10s
**CPU Algorithm**

- **ROIs**
  - Background Subtraction
  - Thresholding

- **Team Markers**
  - Maximum Likelihood (yellow, blue)
  - Blob filling & statistics

- **Pattern Markers**
  - ROI = around Team Marker
  - Maximum Likelihood (green, pink, cyan)
  - Blob filling & statistics

- **Ball**
  - ROI still unclassified
  - Maximum Likelihood (orange)
  - Blob filling & statistics
GPU Algorithm

- ROIs
  - Background Subtraction
  - Thresholding
  - Rejection of dark & bright Regions

- Robot Colors
  - Maximum Likelihood (yellow, blue, green, pink, cyan)

- Ball
  - Maximum Likelihood (orange)
  - Have to have minimal distance to robot center

- Out
  - Color-thresholded image
CPU vs. GPU

Pro CPU
• more robust to lighting changes and uneven illumination
• doesn’t require CUDA

Pro GPU
• faster
• fewer parameters
Demo Video
RESULTS

- Setup
  - Fast and easy

- CPU Algorithm
  - 50 fps
  - Robust robot and ball detections
  - Good performance in changing lighting conditions

- GPU Algorithm
  - >60 fps
  - Robust detections on static lighting conditions
  - Easy parameter tuning